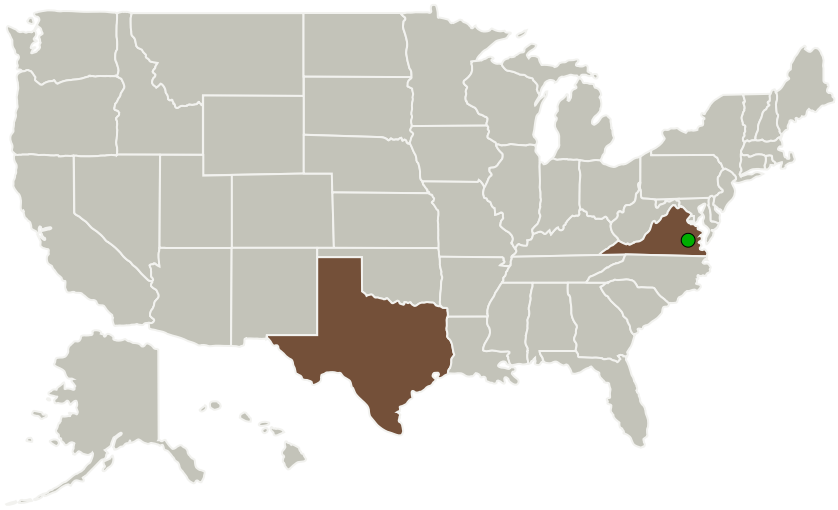
Space Vehicle Inspection High Range Resolution & Raman Spectral LIDAR, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

Systems & Processes Engineering Corporation (SPEC) proposes .65 U cubesat format LIDAR, with class 1 eye-safe lasers for space structure inspection applications. The LIDAR provides both Raman Spectra for determination of the surface chemical content for leak detection and HD6D imaging consisting of ultra high range accuracy 3D LIDAR and RGB camera images fused to give an HD resolution image. Range accuracy for the HD6D is 15 microns to a range of 3 meters with a maximum range of 300m. This capability draws on SPEC part inspection LIDAR. The chemical detection capability can detect one molecule thick layers adsorbed on surfaces determining chemical content, allowing detection of leaks in pressurized or vacuum conditions with a range of 30m. The 3D imaging allows surface imperfections like micro meteor or debris holes to be highlighted, and the chemical content map to be draped on the 3D display. The 3D imaging rate is from 3.2Mpps. The laser transmits an FMCW modulated signal allowing the extreme range accuracy. The 3D imaging uses a 1550nm 2 stage EDFA, while Raman Spectral uses a unit diode, wafer laminate laser at 532nm, induced to operate in a Q-switch mode by modulating the pump.

Primary U.S. Work Locations and Key Partners



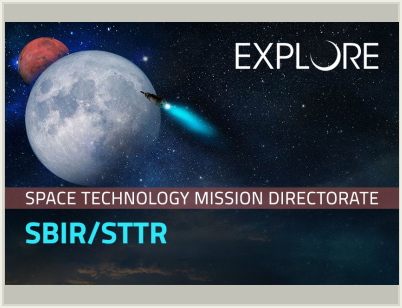


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Space Vehicle Inspection High Range Resolution & Raman Spectral LIDAR, Phase I

Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
Systems & Processes Engineering Corporation	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Austin, Texas
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

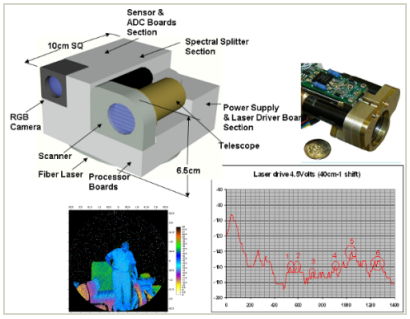
June 2015: Project Start

December 2015: Closed out

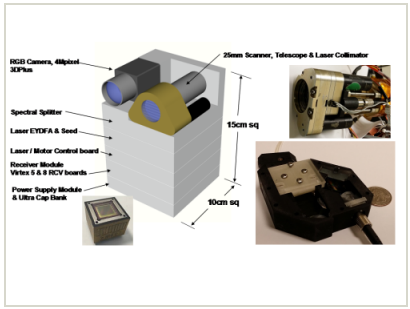
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139360)*

Images



Briefing Chart
Space Vehicle Inspection High Range Resolution & Raman Spectral LIDAR Briefing Chart *(https://techport.nasa.gov/image/132543)*



Final Summary Chart Image
Space Vehicle Inspection High Range Resolution & Raman Spectral LIDAR, Phase I Project Image *(https://techport.nasa.gov/image/136745)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Systems & Processes Engineering Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Brad Sallee

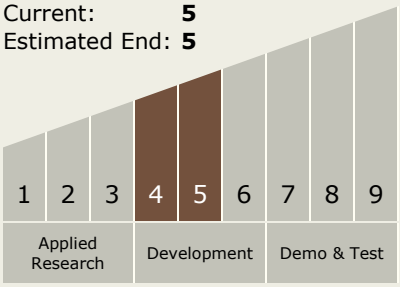
Co-Investigator:
Bradley Sallee

Space Vehicle Inspection High Range Resolution & Raman Spectral LIDAR, Phase I

Completed Technology Project (2015 - 2015)

Technology Maturity (TRL)

Start: **4**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System